

Oregon Business Decisions for Environmental Management

Findings from U.S. EPA Funded Project
on Corporate Environmental Behavior and
Effectiveness of Government Intervention

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Project Team

- David Ervin, PI, Portland State U.
- Madhu Khanna, PI, U. Illinois
- Patricia Koss, PI, Portland State U.
- Junjie Wu, PI, Oregon State U.
- Cody Jones, GRA, Portland State U.
- Cameron Speir, GRA, U. Illinois
- Terry Wirkkala, GRA, Oregon State U.

Objectives

1. Collect primary data on env mgmt practices (EMPs), voluntary env program participation (VEPs), pollution prevention actions (P2) and env performance (EP) for Oregon businesses.
2. Test the influences of market, regulatory and other factors on the adoption of EMPs, VEPs, P2 and EP.
3. Infer the market and policy conditions that promote effective 'voluntary' environmental management programs.

Survey Coverage

| | | |
|-------------------------------------|-------|---|
| Building Construction (236) | 19.6% | Sent to 1964 facilities in Oregon in 2005 |
| Food Manufacturing (311) | 15.4% | 35% response rate |
| Wood Products Mfg (321) | 17.3% | Non-response bias not detected in employment, geographic location or responses across mailing waves |
| Computer & Electronics Mfg (334) | 7.4% | |
| Truck Transport(484) | 18.9% | |
| Accommodation (721) | 20.5% | 5 point Likert scale |

Respondents

| | |
|----------------------------------|-------|
| ● Mean facility revenue (mil \$) | 16.8 |
| ● Retail | 44.7% |
| ● Some R&D capacity | 13.0% |
| ● Publicly traded | 10.4% |
| ● Multinational status | 12.7% |
| ● Revenue spent on env mgmt | 2.4% |
| ● > 0 reg inspection in 2004 | 42.0% |
| ● > 0 env penalty, etc.in 2004 | 2.0% |

Survey

- Designed questions based on literature and industry interviews. (Appendix A)
- Sections
 1. Business environmental mgmt (BEM) motivations
 2. Environmental policies and practices - EMPs, VEPs, and P2
 3. Environmental performance (EP)
 4. General information, e.g. annual revenues, management age

Three Analyses

- I. Discern observable facility characteristics associated with voluntary environmental program participation (VEPs) and EMP adoption.
- II. Examine the strength of various observed and perceived incentives to adopt EMPs and take P2 actions.
- III. Test a new model of BEM in which EMPs link to P2, and EMP and P2 link to EP.

I. Observed Facility Characteristics

Explaining the Count of VEP Participation and EMP Adoption

- VEPs include Climate Savers, Energy Star, ISO 14001, green building programs, etc.
- Factors affecting both VEP and EMP adoption
 - **Regulatory pressures** (particularly related to solid waste)
 - Perception that **environmental issues a significant concern** for the facility
- Factors affecting only EMP adoption
 - **Innovativeness** of facility particularly if ISSUE = 1
- Factors affecting only VEP participation
 - **Size** (number of employees), **MNC** status and **fewer competitors** (particularly if ISSUE=1)

Implications of Count Analysis

- VEP participation is more costly; provides visible signals to enable product differentiation.
- EMP adoption requires more managerial creativity.
- Regulatory pressures are important but impact differs across regulations and type of voluntary activity.

II. Incentives for EMP Adoption and P2 Activities

- Scaled responses to survey questions used to create latent constructs representing extent of EMP and P2 adoption and strength of perceived motivations for adoption from consumers, investors, regulators and other interest groups

➤ Key Findings

- Determinants of extent of EMP implementation
 - Managerial Attitudes, Regulatory Pressures (particularly if ISSUE=0), Investor Pressure, Barriers to Implementation
- Determinants of P2 Adoption
 - Managerial Attitudes, Regulatory Pressures, EMP Adoption
- Competitive Pressures significant in motivating EMP and P2 adoption if ISSUE=1
- Consumer and Interest group pressures not significant

III. Model linking EMP, P2 & EP

- Utility maximization (profit and EM)
- Estimate three equations using principal component indices for EMPs, P2, EP, etc.
 1. EMP intensity = Motivations + Selected Facility Characteristics
 2. P2 use = EMP intensity + EP + Selected Facility Characteristics
 3. EP = EMP intensity + P2 use + Selected Facility Characteristics

Linked Model Findings

- Good fit: R Square = .55
- Significant variables have hypothesized signs, with two exceptions for EP.
- Management values toward environment have largest positive effect on EMPs.
- Competitiveness, regulatory & investor pressures have positive effects on EMPs.
- Index of barriers negatively affects EMPs.
- EMP intensity and reg. inspections affect P2

Linked Model Findings cont'd

- Only facility characteristics affected 2004 change in environmental performance (EP)
 - % Revenue spent on EM in 2003 – positive
 - % Revenue spent on EM in 2004 – negative
 - Parent company ownership – positive
 - Environmental penalty in 2004 – negative
 - Mid-sized facility – positive (suggests a non-linear relationship for facility size)

Conclusions and Implications

- Diverse motivational and market pressures and facility characteristics affect EMP, P2, & EP – Silver bullet approaches will not work.
- BEM decisions depend on more than profit.
- Managerial values and attitudes that environmental issues are important are strong motivators for EMPs, VEPs and P2 actions.

Conclusions and Implications

- Regulatory system is an essential complement to voluntary BEM.
- Key market forces also significantly influence EMP and P2 decisions.
- Information based voluntary environmental management programs must be supported by complementary regulatory and market forces.

Future Work

- Improve environmental performance measures and data.
- Delve into the origins of upper management attitudes on the environment.
- Improve BEM theory and modeling to reflect interdependent decision stages, e.g., VEPs, EMPs, P2, and EP.

Publications and Reports

- Website <http://obep.research.pdx.edu/>
- Project Summary Report
- Hall, Teresa, “Business Decisions for Voluntary Environmental Management: Motivations, Actions and Outcomes,” M.S. Thesis, Oregon State University, 2006.
- Jones, Cody, “Voluntary Environmental Program Participation in Oregon: Summary Statistics,” MEM report, Portland State University, 2007.
- “Motivations for Voluntary Environmental Management,” Policy Studies Journal (forthcoming)
- “Toward a Fuller Understanding of Business Environmental Management” in review

Appendix A

Selected Survey Content and Responses

BEM Motivations

- Consumer interest and willingness to pay for env friendly products/services
- Investor pressure
- Competitiveness concerns
- Interest group pressure
- Regulatory pressures
- Barriers, e.g., upfront costs, time, lack of expertise

| EMPs | Mean Values* | Description 1 = Yes, 0 = No |
|---------------------------|---------------------|--|
| Count | 2.09 | Count of EMPs implemented at the facility, range 0 to 10 |
| Practices Included | 0.41 | Environmental training for employees |
| | 0.37 | Internal environmental standards |
| | 0.25 | Documented environmental policy |
| | 0.25 | Well-defined environmental goals |
| | 0.23 | Environmental audits at regular intervals |
| | 0.17 | Green purchasing policy |
| | 0.17 | Environmental cost accounting |
| | 0.14 | Environmental standards for suppliers |
| | 0.10 | Periodic public publishing of environmental information |
| | 0.02 | Employee compensation for contributions to environmental performance |

| VEPs | Mean | Description 1 = Yes, 0 = No |
|-----------------------------|------|---|
| Count | 0.39 | Count of VEPs the facility participates in, range 0 to 6 |
| Voluntary Programs included | 0.07 | Facility participated in ENERGY STAR |
| | 0.04 | Facility participated in another energy program |
| | 0.04 | Facility participated in LEED |
| | 0.03 | Facility participated in Earth Advantage green building prog. |
| | 0.01 | Facility participated in other green building programs |
| | 0.03 | Facility participated in a recycling program |
| | 0.05 | Facility had obtained ISO 14001 certification |
| | 0.01 | Facility participated in a greenhouse gas reduction prog. |
| | 0.02 | Facility participated in a program designed to reduce multiple impacts, such as the Oregon Natural Step Network |
| | 0.02 | Facility participated in an industry specific program, such as Smartway Transport |
| | 0.05 | Facility participated in another type of program such as water conservation, stormwater management, etc. |

P2 Actions

- Mean = 3.8, SD = 1.1 (Scale:1 low –5 high)
 1. Reduction of spills and leaks is emphasized.
 2. Recycling has increased and landfilling has been reduced.
 3. Pollution prevention is emphasized to improve environmental performance.
 4. Production systems have been modified to reduce waste.
 5. Products have been modified to reduce environmental impacts.
 6. Raw materials are chosen to reduce impacts.

Environmental Performance

- 2004 Impacts

- Wastewater and dewatering discharge
- Solid waste and recycling
- Hazardous or toxic wastes
- Carbon dioxide (CO₂) emissions
- Hazardous air emissions
- Electricity and natural gas (selected)
- Green building/energy efficiency (construction)
- Diesel and biodiesel use (transport)

- Measures: outcomes, compliance, changes

Facility characteristics

- Publicly traded v. privately owned
- Owned by parent company
- Annual revenue
- Multinational operations
- Environmental official and staff
- % revenue spent on environmental mgmt
- R&D capacity
- Operate in retail market
- Number of close competitors
- Age of upper management